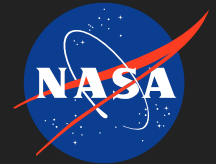


Independent Authentication of ADS-B And Transponder Equipped Aircraft Location, Phase I

Completed Technology Project (2018 - 2019)



Project Introduction

This proposal supports F20 A3.01 - Advanced Air Traffic Management Systems Concepts; Technology Area TA15 : Aeronautics - specifically, independent verification and validation of Aircraft ADS-B transmissions.

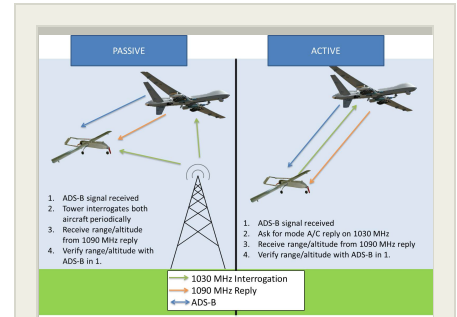
Safely achieving full autonomy and higher density in the NAS requires that the position of every aircraft in a given airspace be known to all participants in that airspace with a very high level of integrity. GNSS (including GPS) and ADS-B can provide sufficient aircraft-to-aircraft accuracy, but the inherent vulnerabilities of GNSS and ADS-B to interference, jamming and spoofing require that GNSS and ADS-B systems be independently validated for accuracy. The ATCRBS (Air Traffic Control Radar Beacon System), based on ground-based radar interrogation of transponders, provides redundant position information in many situations. Where position information from both ADS-B and ATCRBS exists, it can be compared for purposes of verification and validation.) Valid position information needs to be available real time for an autonomous system to provide safe navigation, particularly for collision avoidance. . This proposal will develop a flexible, multi-lateration system that easily integrates the ATCRBS capability of position information into modern avionics designed for ADS-B as well as transponders. This allows redundant independent verification of the location all equipped aircraft in all airspace.

The proposed approach can effectively provide high integrity aircraft location information that can be used for navigation and T-CAS safety functions based on aircraft-to-aircraft ADS-B data, significantly reducing usage of the transponder spectrum.

Anticipated Benefits

Independent Validation of GPS and ADS-B will enable trusted use of ADS-B and allow much higher density use of all airspace for UAS and air transport vehicles. The same techniques can be applied to ground based and space based vehicles for other applications.

Virtually all air vehicles worldwide can make use of this approach to validation of an aircraft position. It is a needed capability for the military and DHS for validation that vehicles in the airspace are where they say they are. Important for police and all emergency vehicles in the airspace as well.



Independent Authentication of ADS-B And Transponder Equipped Aircraft Location, Phase I

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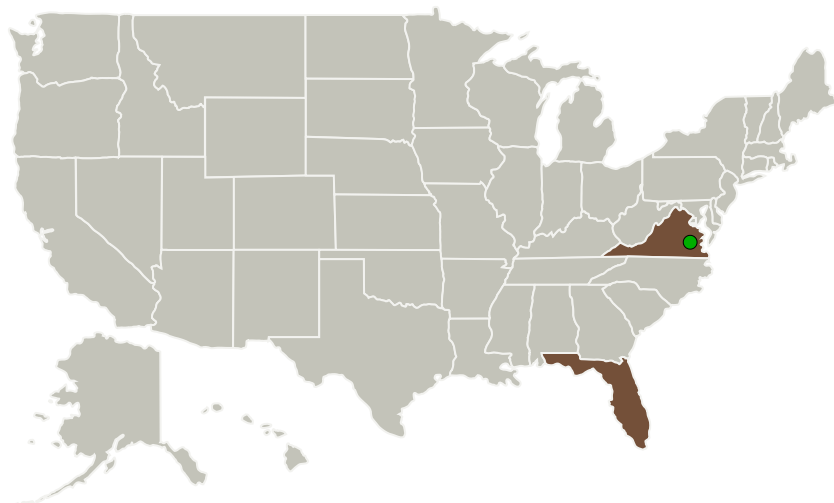
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Independent Authentication of ADS-B And Transponder Equipped Aircraft Location, Phase I

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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
R Cubed Engineering, LLC	Lead Organization	Industry Women-Owned Small Business (WOSB)	Palmetto, Florida
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations

Florida	Virginia
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Project Transitions

July 2018: Project Start

February 2019: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/141107>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

R Cubed Engineering, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

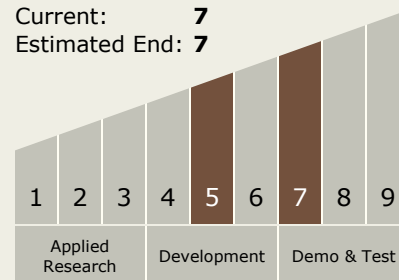
Carlos Torrez

Principal Investigator:

Vincent M Contarino

Technology Maturity (TRL)

Start: **5**
Current: **7**
Estimated End: **7**

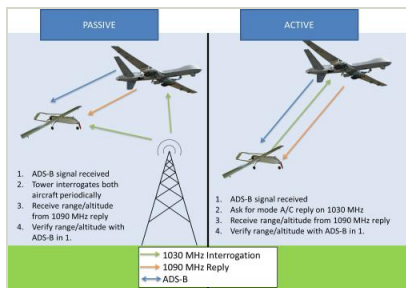


Independent Authentication of ADS-B And Transponder Equipped Aircraft Location, Phase I

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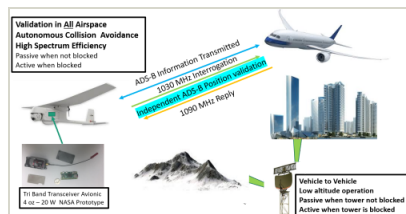


Images



Briefing Chart Image

Independent Authentication of ADS-B And Transponder Equipped Aircraft Location, Phase I
(<https://techport.nasa.gov/image/132533>)



Final Summary Chart Image

Independent Authentication of ADS-B And Transponder Equipped Aircraft Location, Phase I
(<https://techport.nasa.gov/image/137122>)

Technology Areas

Primary:

- TX15 Flight Vehicle Systems
 - └ TX15.1 Aerosciences
 - └ TX15.1.6 Advanced Atmospheric Flight Vehicles

Target Destination

Earth